CLAIMS

We Claim:

1. A chiral nematic liquid crystal display, comprising:

a) a chiral nematic liquid crystal material located between first and second substrates, said material including focal conic and planar textures that are stable in an absence of an electric field;

b) an ambidextrous circular polarizer located adjacent to said first substrate;

c) a transflector having a first side adjacent to said polarizer and a second side; and

d) a light source adjacent to said light second side.

2. The liquid crystal display of claim 1 wherein said planar texture has a circular polarization of a predetermined handedness.

3. The liquid crystal display of claim 1 wherein said light source is selectively energizeable to emit light through said transflector.

4. The liquid crystal display of claim 1 wherein said ambidextrous polarizer comprises a first quarter wave retarder and a second quarter wave retarder and a linear polarizer located between said first quarter wave retarder and said second quarter wave retarder.

5. The liquid crystal display of claim 1 further comprising an alignment material on at least one of said first and second substrates.

6. The liquid crystal display of claim 5 wherein said alignment material has a pretilt angle of about 21° from the substrate.

7. The liquid crystal display of claim 5 wherein light reflected from said display has an S3 stokes parameter greater than 0.75.

8. The liquid crystal display of claim 5 wherein light reflected from said display has an S3 stokes parameter greater than 0.90.

9. The liquid crystal display of claim 1 further comprising a rubbed alignment material on both of said first and second substrates.

10. The liquid crystal display of claim 1 further comprising a rubbed alignment material on said first substrate.

11. The liquid crystal display of claim 1 wherein said light source has a spectral distribution that matches a reflection spectrum of the display.

12. A chiral nematic liquid crystal display, comprising:

a) a chiral nematic liquid crystal material located between first and second substrates, said material including a planar texture having a circular polarization of a predetermined handedness and a focal conic texture that are stable in an absence of an electric field;

b) a first quarter wave retarder located adjacent to said first substrate;

c) a linear polarizer located adjacent to said first quarter wave retarder;

d) a second quarter wave retarder located adjacent to said linear polarizer;

e) a transflector having a reflective side adjacent to said second quarter wave retarder and a light transmitting side; and

f) a light source adjacent to said transmitting side, said light source being selectively energizeable to emit light through said transflector.

13. The liquid crystal display of claim 12 wherein said light source has a spectral distribution that matches a reflection spectrum of the display.

14. The liquid crystal display of claim 12 further comprising an alignment material on at least one of said first and second substrates.

15. The liquid crystal display of claim 14 wherein said alignment material has a pretilt angle of about 21° from the substrate.

16. The liquid crystal display of claim 14 wherein light reflected from said display has an S3 stokes parameter greater than 0.75.

17. The liquid crystal display of claim 14 wherein light reflected from said display has an S3 stokes parameter greater than 0.90.

18. The liquid crystal display of claim 12 further comprising a rubbed alignment material on at both of said first and second substrates.

19. A method of operating a liquid crystal display, comprising:

a) emitting light from a light source;

b) passing said light through a transflector;

c) passing said light through an ambidextrous circular polarizer to polarize said light with a selected circular handedness;

d) controlling a chiral nematic liquid crystal material located between first and second substrates to selectively exhibit a planar texture and a focal conic texture;

e) passing said circularly polarized light through said material when said material exhibits said focal conic texture;

f) reflecting said circularly polarized light with said material when said material exhibits said planar texture; and

g) absorbing said light reflected by said material with said ambidextrous circular polarizer.

20. The liquid crystal display of claim 19 wherein said light source has a spectral distribution that matches a reflection spectrum of the display.

21. The method of claim 19 wherein said light source is selectively energized and de-energized in response to an intensity of ambient light.

22. A method of operating a liquid crystal display, comprising:

a) controlling a chiral nematic liquid crystal material located between first and second substrates to selectively exhibit a planar texture and a focal conic texture;

b) reflecting a portion of incident light with said material when said liquid crystal exhibits said planar texture;

c) passing said incident light through said material when said liquid crystal exhibits said focal conic texture;

d) passing said light passed through said material through an ambidextrous circular polarizer to polarize said light with a selected circular handedness;

e) reflecting said light passed through said polarizer with a transflector; and

f) absorbing said light reflected by said transflector with said ambidextrous circular polarizer.

23. The method of claim 22 wherein a majority of said light reflected by said liquid crystal material is circularly polarized having a given handedness.

24. The method of claim 22 wherein the light passed through said ambidextrous circular polarizer passes through a first quarter wave retarder, a

linear polarizer and a second quarter wave retarder.

25. A method of operating a liquid crystal display, comprising:

a) setting the liquid crystal display to a front lit mode;

b) controlling a chiral nematic liquid crystal material located between first and second substrates to selectively exhibit a planar texture and a focal conic texture;

c) reflecting a portion of incident ambient light with said liquid crystal material when said liquid crystal exhibits said planar texture;

d) passing said incident ambient light through said liquid crystal material when said liquid crystal material exhibits said focal conic texture;

e) passing said ambient light passed through said liquid crystal material through an ambidextrous circular polarizer to polarize said ambient light with a selected circular handedness;

f) reflecting said ambient light passed through said ambidextrous circular polarizer with a transflector;

g) absorbing said ambient light reflected by said transflector with said ambidextrous circular polarizer;

h) setting the liquid crystal display to a back lit mode;

i) emitting light from a light source;

j) passing said light from said light source through a transflector;

k) passing said light from said light source through said ambidextrous circular polarizer to polarize said light from said light source with said selected circular handedness;

l) passing said circularly polarized light from said light source through said liquid crystal material when said liquid crystal material exhibits said focal conic texture;

m) reflecting said circularly polarized light from said light source with said liquid crystal material when said liquid crystal material exhibits said planar texture; and

n) absorbing said light from said light source reflected by said liquid crystal material with said ambidextrous circular polarizer.

26. A chiral nematic liquid crystal display, comprising:

a) a chiral nematic liquid crystal material located between first and second substrates, said material including focal conic and planar textures that are stable in an absence of an electric field, said liquid crystal material reflects light from said display that has an S3 stokes parameter greater than 0.75.

b) an ambidextrous circular polarizer located adjacent to said first substrate;

c) a transflector having a first side adjacent to said polarizer and a second side; and

d) a light source adjacent to said light transmitting side.

27. A method of operating a liquid crystal display, comprising:

a) emitting light from a light source;

b) polarizing said light with a selected circular handedness;

c) controlling a chiral nematic liquid crystal material located between first and second substrates to selectively exhibit a planar texture and a focal conic texture;

d) passing said circularly polarized light through said material when said material exhibits said focal conic texture;

e) reflecting said circularly polarized light with said material when said material exhibits said planar texture; and

f) absorbing said light reflected by said material when said material exhibits said planar texture.

28. The method of claim 27 wherein light reflected by said material has an S3 stokes parameter greater than 0.75.

29. The method of claim 27 wherein light reflected by said material has an S3 stokes parameter greater than 0.90.

30. The liquid crystal display of claim 27 wherein said light source has a spectral distribution that matches a reflection spectrum of the display.

31. The method of claim 27 wherein said light source is selectively energized and de-energized in response to an intensity of ambient light.

32. A method of operating a liquid crystal display, comprising:

a) controlling a chiral nematic liquid crystal material located between first and second substrates to selectively exhibit a planar texture and a focal conic texture;

b) reflecting a portion of incident light with said material when said liquid crystal exhibits said planar texture;

c) passing said incident light through said material when said liquid crystal exhibits said focal conic texture;

d) polarizing said light passed through said material with a selected handedness of circular polarization;

e) reflecting said light passed through said material; and

f) absorbing said light passed through said material.

33. The method of claim 32 wherein light reflected by said material has an S3 stokes parameter greater than 0.75.

34. The method of claim 32 wherein light reflected by said material has an S3 stokes parameter greater than 0.90.